EMCO

ELECTRONICS

(ISO 9001:2000 COMPANY)

Parallel Control Unit

EE-501

INSTRUCTION MANUAL

Instruction Manual
for
Parallel Control Unit
Type EE-501

EMCO ELECTRONICS

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I GENERAL DESCRIPTION

The Parallel Control Unit (PCU) is used for controlling 2 Transformers in parallel. The transformers have to be identical i.e. with the same number of taps.

“Raise” & “Lower” NO contacts from AVR1 & AVR2 are connected to the PCU, & the outputs from the PCU are connected to the OLTC1 & OLTC2 respectively.

Switches on the front panel of PCU allows for selecting AVR1 or AVR2 as master & the other as the follower, or both AVRs as independent (masters).

Tap Position of both the Transformers are displayed on the PCU. When the master AVR gives either Raise / Lower Pulse to the transformer, the tap numbers are compared after some delay & if there is a difference in the tap nunbers the Raise / Lower pulse is given to the follower.

Incase the tap position of the 2 transformers in parallel are unequal for 5 minutes, out of step indication is given & both OLTCs are blocked.

External A/M Switch (NO contacts) are sensed for determining Auto / Manual mode of operation. When manual mode is selected, the PCU is blocked i.e. no output pulses are given to the OLTCs. The PCU is also blocked when both the AVRs are set in follower mode.

II TECHNICAL SPECIFICATIONS

Auxiliary Supply	:	110V/230V AC, 50Hz, ±15%, 15VA
Maximum Tap No. of Transformers	:	21 (to be specified in PO & should be the same for both transformers)
Time Delay between Master & Follower Pulse	:	Settable between 10 to 150 secs
Mode of Operation	:	Selected through Front Panel Switches ¯ ¯ - Independent AVRs ¯ - - AVR1 (Master), AVR2(Follower) - ¯ - AVR1 (Follower), AVR2(Master) - - - PCU blocked
Overall Size	:	92mm X 192mm X 220mm (H X W X D)
Panel Cutout	:	90mm X 184mm(H X W)

Inputs

Auto / Manual	:	External (NO) potential free contacts
Raise & Lower Input Pulses	:	(NO) potential free contacts from AVR1 & AVR2.
Tap Position Indicators	:	3 wires from Resistor Chain (Max, Wiper, Min) with 1KW / step from both OLTCs
Bus Coupler Input	:	(NO) potential free contacts from Bus Coupler

Outputs

Raise / Lower Pulses to OLTCs	:	2 seconds ON duration with LED indication 1 pair of (NO) contacts each for Raise & Lower for both the Transformers with 5A@ 115VAC or 24VDC.
Out of step condition	:	LED indication with 1 pair of (NO) contacts of same rating.
Bus Coupler Output	:	(NO) potential free contacts for indicating Bus Coupler closure.
4 - 20mA outputs for TPIs	:	4 - 20mA DC output with 100W termination for both the TPIs.

III FRONT PANEL INDICATIONS / CONTROLS

INDICATIONS (Refer Drg. No. 07-ED-02)

1) TAP No.1	:	Displays the Tap position of Transformer1.
2) TAP No.2	:	Displays the Tap position of Transformer2.
3) SW1	:	Selects AVR1 as Master / Follower In - position AVR1 is selected as Follower
4) SW2	:	Selects AVR2 as Master / Follower In - position AVR2 is selected as Follower When both the Switches are in ¯ position, both the Transformers are independent When both the Switches are in - position, the PCU is blocked i.e. no Raise / Lower pulses are given from the PCU.
5) TIME DELAY	:	Delay between the Master and Follower Pulses, settable from 10 to 150 seconds.

6) RR1 LED	:	Indicates output Raise pulse given to OLTC1.
7) LR1 LED	:	Indicates output Lower pulse given to OLTC1.
8) RR2 LED	:	Indicates output Raise pulse given to OLTC2.
9) LR2 LED	:	Indicates output Lower pulse given to OLTC2.
10) Out of Step LED	:	Indicates out of step condition i.e.Tap Nos of both Transformers are not equal for 5 minutes
17) MAN LED	:	Indicates Manual mode of operation. External A/M Switch (NO contacts) when closed, the Manual mode is selected. All output pulses from the PCU are blocked in Manual mode.
18) Parallel Mode LED	:	Indicates Parallel mode of operation. When the Bus Coupler is closed, a pair of (NO) contacts is sensed and the indicator glows after a delay of 60 secs.

REAR PANEL

FUSE

Auxiliary Fuse	:	300 mA

REAR PANEL CONNECTIONS (Refer Drg. No. 07-ED-03)

1 - 2	:	Auxiliary Supply, 110V / 230VAC, 50Hz.
3 - 4	:	(NO) contacts of Lower pulse from AVR1
5 - 6	:	(NO) contacts of Raise pulse from AVR1
7 - 8	:	(NO) contacts of Lower pulse from AVR2
9 - 10	:	(NO) contacts of Raise pulse from AVR2
11 - 12 - 13	:	Tap position of Transformer1(+, w, -)
14 - 15 - 16	:	Tap position of Transformer2(+, w, -)
17 - 18	:	External A / M Switch (NO) potential free contacts

19 - 20	:	(NO) Contacts for Lower Pulse to OLTC1
21 - 22	:	(NO) Contacts for Raise Pulse to OLTC1
23 - 24	:	(NO) Contacts for Lower Pulse to OLTC2
25 - 26	:	(NO) Contacts for Raise Pulse to OLTC2
27 - 28	:	(NO) Contacts for Out of step condition.
29 - 30	:	4 -20 mA output for Tap No of Transformer1
31 - 32	:	4 -20 mA output for Tap No of Transformer2
33 - 34	:	(NO) Contacts Input from Bus Coupler
35 - 36	:	(NO) Contacts Output for indicating Parallel Mode

IV OPERATING PROCEDURE

1. Connect the Auxilliary Supply (110/230V AC) to pins 1 & 2 of Terminal Block.

2. Connect the Raise / Lower NO Contacts from AVR1 & AVR2 to respective pins (3 to 10 of Terminal Block).

3. Connect Tap Indicator wires from OLTC1& 2 to respective pins (11 to 16 of Terminal Block).

4. Connect (NO) contacts of External A / M Switch to pins 17 & 18 of terminal block.

5. Connect (NO) contacts (input) from Bus Coupler to pins 33 & 34 of terminal block.

6. Connect output Raise / Lower (NO) Contacts to OLTC1 & 2 respectively (pins 19 to 26). Switch ON the Parallel Control Unit. Select Manual mode through External A / M Switch. Bring both the transformers to equal tap position. Put the A / M Switch back to Auto mode.

7. **Independent Mode of operation**
Select both AVR1 & AVR2 as Masters i.e. both Front Panel Switches in ¯ position (Independent mode). When a Raise / Lower pulse comes from AVR1 / AVR2, the same is directed to OLTC1 / OLTC2 without any delay.

8. **Parallel Mode of operation**
When the Master / Follower mode is selected,and the 2 tap nos.are not equal, the PCU automatically gives pulses to the Follower (after the set delay is over), till the Follower Tap No. is equal to the Master.The delay between the pulses is equal to the Set Time Delay.

Select AVR1 as Master & AVR2 as Follower. When the AVR1(master) gives Raise / Lower pulses, the same is directed to OLTC1 without any delay. After the set delay (on the front panel of PCU) is over, if there is a difference in the Tap nos. of the 2 transformers, the PCU gives a Raise / Lower pulse to the follower Transformer.

Select AVR1 as Follower & AVR2 as Master. When the AVR2 (master) gives Raise / Lower pulses, the same is directed to OLTC2 without any delay. After the set delay (on the front panel of PCU) is over, if there is a difference in the Tap nos. of the 2 transformers, the PCU gives a Raise / Lower pulse to the follower Transformer1.

9. When both AVR1 & AVR2 are selected as followers, the PCU is blocked, i.e no output pulses are available from the PCU & Out of step indication is also blocked.

10. Incase of any mal-operation, if the tap nos. of both the transformers are not equal for more than 5 minutes, Out of Step indication is given and a pair of (NO) contacts will close on terminal block. Out of Step indication is available only for Master - Follower mode.

11. The PCU is internally blocked for Min./Max. taps at positions 2 & 16 respectively, i.e. no further Lower pulse can be given when tap 2 is reached & no further Raise pulse is given when tap 16 is reached.

12. Incase the wipers of TPIs is open, 00 is displayed. Incase the master TPI's wiper is open, then the PCU is blocked i.e. no Raise / Lower pulses are given & out of step indication is given after 5 minutes. Incase follower TPI's wiper is open pulses are given to the master only. However if both the TPIs are open, the PCU is blocked and no out of step indication occurs.

13. The delay T2 setting (for consecutive pulses) on the master AVR should be greater than the delay setting on the PCU, so that the second pulse comes after the follower has completed a tap change. Incase a second pulse comes before the follower has changed, then this pulse is ignored.

14. Put the external Auto / Manual Switch in Manual mode. No output pulses are available from the PCU, & out of step indication is also blocked.

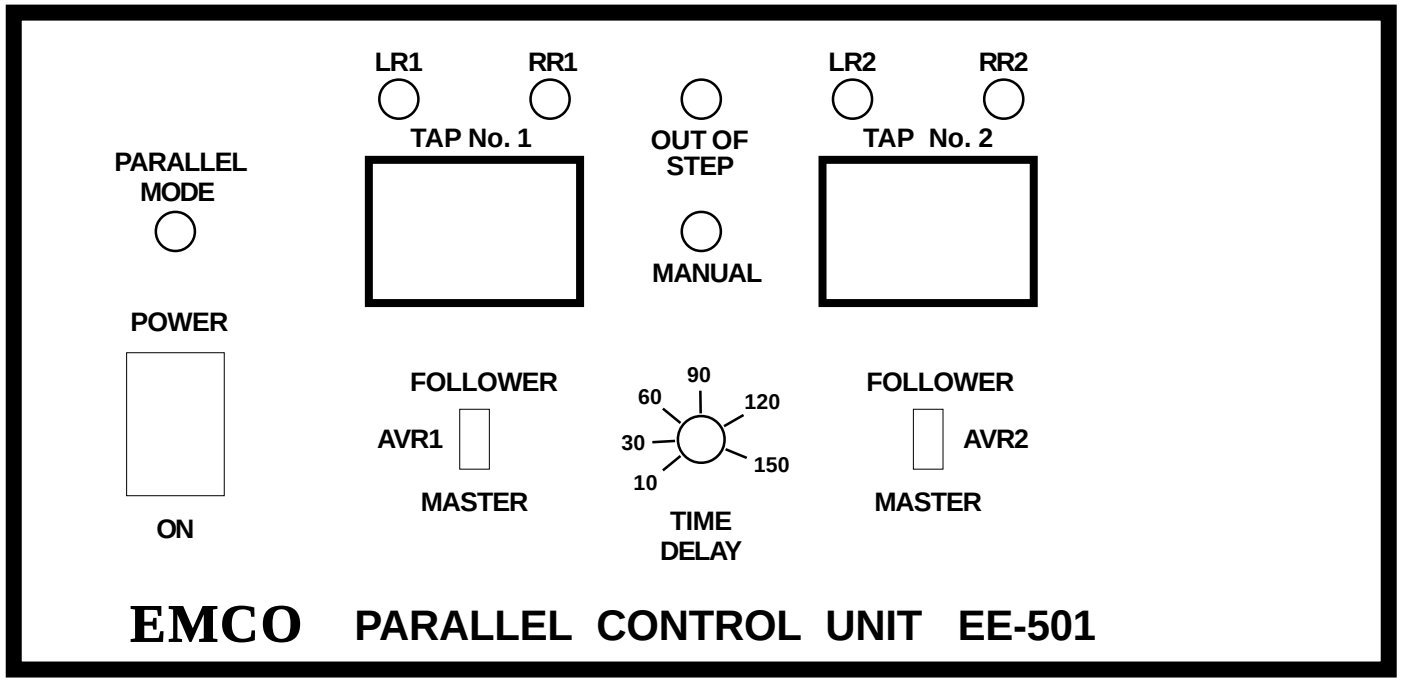
Note : Incase PCU is not in use, the (NO) contacts of AVR1 & AVR2 which have been wired to the PCU should be disconnected from the PCU, if the same contacts are to be used for driving the tap changers.

V LIST OF DRAWINGS

Front Panel Drg. No. 07-ED-02

Rear Panel Connections & Panel Cutout Drg. No. 07-ED-03

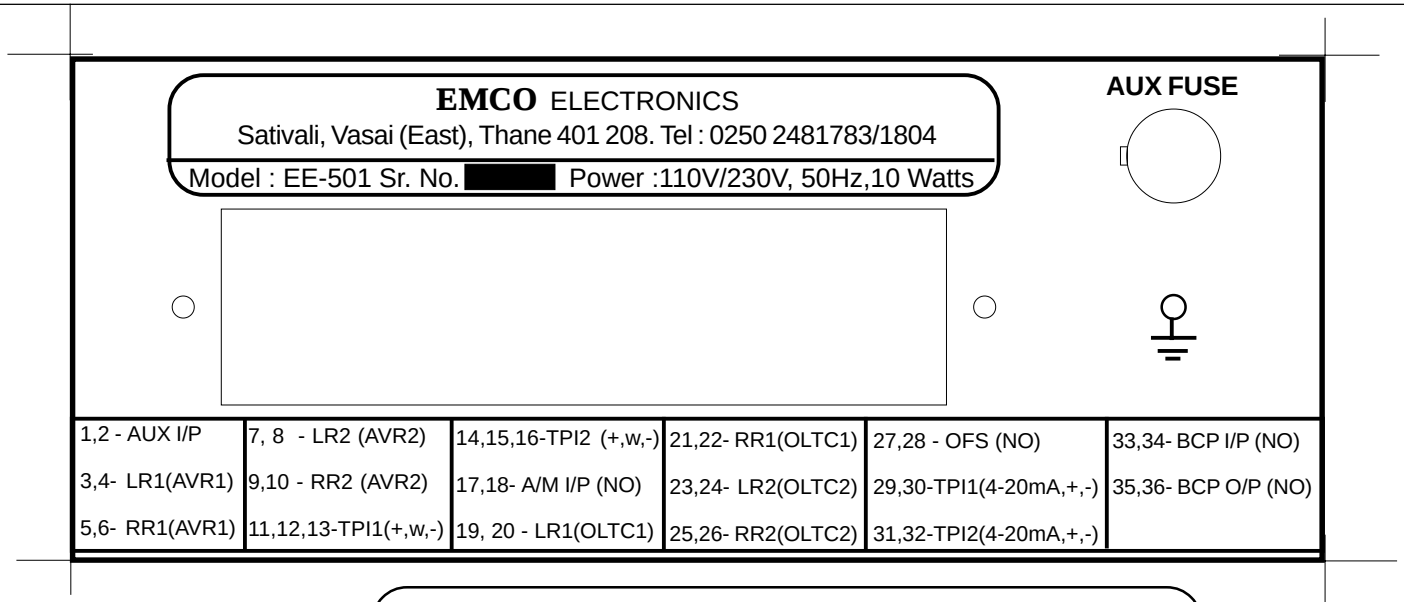
FOR TOLERANCES NOT SPECIFIED, REFER DIMENSION TOLERANCE CHART PD00 - 606



4			ALL DIMENSIONS ARE IN mm UNLESS STATED OTHERWISE.		
3			PRODUCT : PCU EE-501		**EMCO ELECTRONICS**
2			ASSEMBLY : -		TITLE : FRONT PANEL
1			MATERIAL : POLYCARBONATE	SCALE: 1:1	
ISS.	DATE	APPR.BY	DRN.BY : J.J.P.	DATE: 30-06-05	DRG. No. :07-ED-02/ISS.1

DOC NO. : DC00-405/ISS.1

FOR TOLERANCES NOT SPECIFIED, REFER DIMENSION TOLERANCE CHART PD00 - 606



PANEL CUT OUT - 90 X 184mm

TERMINAL BLOCK CONNECTIONS

PIN Nos	INPUTS	PIN Nos	OUTPUTS
1 - 2	AUX I/P	19 - 20	LR1 (NO) to OLTC1
3 - 4	LR1 (NO) from AVR1	21 - 22	RR1 (NO) to OLTC1
5 - 6	RR1 (NO) from AVR1	23 - 24	LR2 (NO) to OLTC2
7 - 8	LR2 (NO) from AVR2	25 - 26	RR2 (NO) to OLTC2
9 - 10	RR2 (NO) from AVR2	27 - 28	OUT OF STEP (NO)
11 - 12 - 13	TPI 1 (+, W, –)	29 - 30	4 - 20 mA TPI 1(+, –)
14 - 15 - 16	TPI 2 (+, W, –)	31 - 32	4 - 20 mA TPI 2(+,–)
17 - 18	A / M SW (NO)	35 - 36	BUS CPL O/P (NO)
33 - 34	BUS CPL I/P (NO)		

4			ALL DIMENSIONS ARE IN mm UNLESS STATED OTHERWISE.		
3			PRODUCT : EE-501		**EMCO ELECTRONICS**
2			ASSEMBLY : -		TITLE : REAR PANEL CONNECTIONS
1			MATERIAL : -	SCALE: 1:1	AND PANEL CUTOUT
ISS.	DATE	APPR.BY	DRN.BY : J.J.P.	DATE:30-06-05	DRG.No.: 07-ED-03/ISS.1

DOC NO. : DC00-405/ISS.1

VI. WARRANTY

This product from **EMCO ELECTRONICS** is warranted against defects in materials and workmanship for a period of 12 months from the date of despatch to the first buyer/ purchaser of this equipment, this being essentially limited by warranties given to **EMCO ELECTRONICS** on the component used in equipment.

During the warranty period **EMCO ELECTRONICS** will at its option, either repair or replace the product which prove to be defective provided the product has been used with reasonable care and in accordance with the manuals / product specification. Consequently this warranty shall also not apply to defects/damages in transit or resulting from misbehaving, misuse, unauthorised modifications or repairs operations outside the environmental, electrical and/or other specification, improper or inadequate maintenance of the product, or site conditions as required/recommended and damages arising from accidental or abnormal causes.

The warranty period for items repaired/replaced shall not exceed the period for which the equipment was originaliy warranted and also the liability of **EMCO ELECTRONICS** to the purchaser shall not in any case, exceed the original purchase price of the equipment.

For warranty service or repair, the equipment must be returned to **EMCO ELECTRONICS** securely packed on Frieght paid basis and accompanied by a certificate stating that the equipment is being returned for warranty repairs and also a note giving details of the purchase (Purchaser's Name and address, invoice No. and Date of purchase) and details of the equipment failure, fault conditions, other useful information to fasciliate early repair / rectification of the equipment.

Return of equipment duly repaired can be arranged on payment of the packing and forwarding charges together with any other taxes. duties, other miscellaneous expenses incurred, altematively the purchaser may arrange to collect the equipment from **EMCO ELECTRONICS.** In case the repairs are not covered under warranty, the charges tor the same must also be paid before collection of the equipment.

Our engineer’s services are available at site for instruments during warranty or out of warranty period, on chargeable basis, details of which are available on request.

In the interest of development and improvement, **EMCO ELECTRONICS** reserve the right to amend without notice details contained in this publication. No legal liabilities will be accepted by **EMCO ELECTRONICS** for any errors, omissions or amendments.